

**What is claimed is:**

**1. An underwater building unit, characterized in that:**

the underwater building unit includes a caisson with both ends open and is composed of two rows of box boards not being intersected with each other;

each row of box boards consists of a set of stake-plate body combinations and bind members between every two adjacent stake-plate body combinations;

a positioning beam is located on the top of the box boards and connects the two box boards; and

a cross rib is at the middle section of the outer surface of the plate body of each bind member.

**2. The underwater building unit according to claim 1, characterized in that:**

the said bind members are positioning stake-plate body combinations (1) which are located above the cross rib of the plate body and have outwardly protruded parts, the stake-plate body combination (2) and the positioning stake-plate body combination (1) are mounted facing each other in two rows of box boards respectively;

positioning beam mounting grooves are formed in the middle of the top edge of the plate body of the positioning stake-plate body combination (1), at least a part of the main girder of the positioning beam (3) is embedded into the positioning beam mounting groove; and

the length of the main girder of the positioning beam (3) should be consistent with the distance between the outer surface of the plate bodies of the two opposite positioning stake-plate body combinations (1) of two rows of box boards.

**3. The underwater building unit according to claim 2, characterized in that:**

a cross rib is provided on the outer surface of the stake-plate body combination (2), is located at the position being consistent with that of the cross rib on the plate body of the positioning stake-plate body combination (1), and is coupled with the outwardly protruded parts of the plate body of the positioning

stake-plate body combination (1).

4. The underwater building unit according to claim 1, characterized in that:

the stake-plate body combination (11) in two rows of box boards is mounted in pairs and facing each other, the said bind member is a positioning baffle (12) comprised of a plate body and an outward lug protruded outwardly along the direction of its outer surface on the upper edge of the plate body; and

a groove is provided on the lower surface of the positioning plate body at the two ends of the positioning beam (13) to be coupled with the upper part of the middle stake of the stake-plate body combination (11), the length of the main girder of the positioning beam (13) should be consistent with the distance between the outer edges of the plate bodies of the two opposite positioning stake-plate body combinations (11) of the two rows of box boards.

5. The underwater building unit according to claim 4, characterized in that:

the cross rib on the positioning baffle (12) is composed of at least one cross rib (14) connecting the two vertical ribs (15) at the middle part of the positioning baffle (12).

6. The underwater building unit according to claims 1, 2, 3, 4 or 5, characterized in that:

a wall formed with plate body-plate body combination (7) is provided on the top of the open caisson, the plate body-plate body combination (7) is composed of two plate bodies posed at an angle and the connecting plate body (8) between the two plate bodies, a space is provided between the upper and the lower end surfaces of the plate body-plate body combination (11) and the plate body for the cast-in-place concrete.

7. The underwater building unit according to claim 6, characterized in that:

reinforcing bar through holes (9) are formed on the connecting plate body (8).

8. The underwater building unit according to claim 7, characterized in that:

the upper and the lower end surfaces of the connecting plate body (8) is

perpendicular to one of the plate bodies.

9. The underwater building unit according to claim 8, characterized in that:

the connecting plate body (8) is integrally formed as a single unit with one of the plate body, a corresponding mounting hole is formed on the other plate body, pre-buried reinforcing bars (10) are placed inside the hole, and protruded pre-buried reinforcing bars are provided on the end surface on which the connecting plate body (8) is connected with the plate body.

10. The underwater building unit according to claim 6, characterized in that:

a breakwater (6) is provided above the plate body-plate body combination (7).

11. An installation method of the underwater building unit according to any one of claims 1 to 10, characterized in that:

- a. locate the insert plate centring frame on water bottom along design direction;
- b. put two rows of stake-plate body combination to a predetermined depth according to the position mark of the centring frame above water surface and set in place;
- c. hang the positioning frame away;
- d. for each row of stake-plate body combination, put positioning stake-plate body combination into the preserved gaps between every two adjacent stake-plate body combinations and make the outwardly protruded positioning part lock the stake-plate body combination and positioned by a cross rib; and
- e. locate the no-ear positioning beam in the open groove of the positioning stake-plate body combination.

12. An installation method of the underwater building unit according to any one of claims 1 to 10, characterized in that:

- a. locate the insert plate centring frame on water bottom along design direction;

- b. put two rows of stake-plate body combination to a predetermined depth according to the position mark of the centring frame above water surface and set in place;
- c. hang the insert plate centring frame away;
- d. make positioning beam with forked ear buckled on two stake-plate body combinations to make the opening of the positioning beam baffle and the stake of the stake-plate body combinations being lock by each other; and
- e. for each row of stake-plate body combination, put the baffle with rib in the space between two adjacent stake-plate body combinations.

13. The installation method of the underwater building unit according to claims 11 or 12, characterized in that:

in case the foundation is too soft, when inserting stake-plate body combination or positioning stake-plate body combination, put the stake into foundation to a predetermined depth first and fill with grit or crushed stone through stake hole, then lift the stake to make the filling material spread into the gap around the tip of the stake and then put the stake back in.

14. An application method of the underwater building unit according to any one of claims 1 to 10, characterized in that:

the construction of the sea entry road is proceeded as follows:

- a. put the open caisson into water;
- b. make the open caisson full of rubble;
- c. add rubble to design height;
- d. place mould plate above two rows of structural members of the open caisson; and
- e. cast-in-place concrete between mould plates to design height.

15. An application method of the underwater building unit according to any one of claims 1 to 10, characterized in that:

the construction of the artificial island is proceeded as follows:

- a. put the open caisson into water and form an annular frame;
- b. make the open caisson full of rubble;
- c. install the plate body-plate body combination on top of the open caisson;
- d. put the trunk reinforcing bar through the reinforcing bar through hole in the plate body-plate body combination and tie up the trunk reinforcing bars with hoops;
- e. cast-in-place concrete in the plate body-plate body combination and preserve space for the breakwater;
- f. install the breakwater at the preserved space; and
- g. fill the inside of the annular wall formed by the plate body-plate body combinations and the breakwater with dry soil until reaching the height of the wall.

16. An application method of the underwater building unit according to any one of claims 1 to 10, characterized in that:

the construction of the seawall is proceeded as follows:

- a. put the open caisson into water along design direction;
- b. make the open caisson full of rubble;
- c. install the plate body-plate body combination on top of the open caisson;
- d. put the trunk reinforcing bar through the reinforcing bar through hole on the plate body-plate body combination and tie up the trunk reinforcing bars with hoops;
- e. cast-in-place concrete in the plate body-plate body combination and preserve space for the breakwater;
- f. install the breakwater at the preserved space; and
- g. fill the inside of the downstream face of the wall formed by the plate body-plate body combination and the breakwater with dry soil until reaching the height of the wall body.